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NASA Policy Directive

NPD 8730.1C

Effective Date: June 27, 2011

Expiration Date: June 27, 2016

COMPLIANCE IS MANDATORY[Printable Format \(PDF\)](#)

Request Notification of Change (NASA Only)

Subject: Metrology and Calibration (Update w/change 1)**Responsible Office: Office of Safety and Mission Assurance**

CHANGE HISTORY

Chg #	Date	Description/Comments
1	10/2/2014	Update for 1400 Compliance for 7. Measurement/Verification; and clarify two requirements in 5. Responsibility

1. POLICY

a. It is NASA policy to:

- (1) Control measurement processes to ensure the accuracy of measurement results affecting safety and mission success. Functions and conditions requiring measurement controls are identified in Attachment A.
- (2) Establish and maintain traceability of measurement results by an unbroken chain of calibrations through the National Institute of Standards and Technology (NIST), or an institution recognized by NIST through international agreements, to the International System of Units (SI) when such units have been established.
- (3) Control the accuracy, reliability, and use of Measuring and Test Equipment (MTE) through the use of a calibration system compliant with the requirements of American National Standards Institute/National Conference of Standards Laboratories (ANSI/NCSL) Z540.3-2006 and applicable requirements of Society of Automotive Engineers (SAE) AS9100, subject to the clarifications and modifications provided in Attachment B of this NASA Policy Directive (NPD).

2. APPLICABILITY

- a. This NPD is applicable to NASA Headquarters and NASA Centers, including Component Facilities and Technical and Service Support Centers. This language applies to the Jet Propulsion Laboratory (JPL), other contractors, grant recipients, or parties to agreements only to the extent specified or referenced in the appropriate contracts, grants, or agreements.
- b. Paragraph 1.a(3) above does not apply to NASA acquisition contracts and Center institutional service contracts initiated prior to promulgation of this NPD. Retroactive application of this policy to existing contracts is at the discretion of the applicable NASA program manager or Center Director based on an evaluation of risk related to the retention of previously existing requirements versus implementation of this NPD revision.
- c. Compliance with the requirements of this NPD may be phased in over a period of time not to exceed 36 months from its date of issue. Waivers to ANSI/NCSL Z540.3 implementation requirements are to be processed in accordance with NASA-STD-8709.20.

d. The requirements of this NPD are in addition to, not in replacement of, requirements specified by official local, State, or Federal regulatory bodies. Where conflicts exist, requirements specified by regulatory bodies take precedence.

3. AUTHORITY

- a. The National Aeronautics and Space Act, 51 U.S.C. § 20113(a).
- b. Federal Acquisition Regulations (FAR), Quality Assurance, 48 C.F.R. pt. 46.
- c. NASA FAR Supplement, Quality Assurance, 48 C.F.R. pt. 1846.

4. APPLICABLE DOCUMENTS AND FORMS

- a. NASA Procedural Requirements (NPR) 7120.8, NASA Research and Technology Program and Project Management Requirements.
- b. NPR 8705.6, Safety and Mission Assurance Audits, Reviews, and Assessments.
- c. NASA-STD-8709.20, Management of Safety and Mission Assurance Technical Authority (SMA TA) Requirements.
- d. NASA-HDBK 8739.19-4, Estimation and Evaluation of Measurement Decision Risk, NASA Measurement Quality Assurance Handbook - ANNEX 4.
- e. ANSI/NCSL Z540.1-1994 (R2002), Calibration Laboratories and Measuring and Test Equipment - General Requirements (Note: ANSI/NCSL Z540.1-1994 has been cancelled by the applicable industry standards writing body. For the purposes of this NPD, however, it remains an active document per Attachment B, paragraph B.2.).
- f. ANSI/NCSL Z540.3-2006, Requirements for the Calibration of Measuring and Test Equipment.
- g. SAE AS9100, Quality Management Systems - Requirements for Aviation, Space and Defense Organizations.
- h. National Conference of Standards Laboratories International (NCSLI) Handbook for the Application of ANSI/NCSL Z540.3-2006, Requirements for the Calibration of Measuring and Test Equipment.

5. RESPONSIBILITY

- a. The Chief, Safety and Mission Assurance shall:

- (1) Provide interpretive guidelines, training resources, and tools for the implementation of the requirements of this NPD (Requirement).
- (2) Designate a responsible Center with delegated Metrology and Calibration Program responsibilities (Requirement). Delegated responsibilities include development of policy and procedural requirements, issuance of guidance documents, and deployment of tools/resources facilitating Center Metrology and Calibration Program implementation.
- (3) Authorize the charter and resources for the NASA Metrology and Calibration Working Group (MCWG) (Requirement). The MCWG serves as a collaborative forum for the development of Agency requirements, guidance, and tools for effective metrology/calibration program implementation.

- b. Center Directors shall:

- (1) Establish, implement, and monitor metrology and calibration requirements to implement the policy provided in paragraph 1 of this NPD for Center institutional functions delineated in Attachment A of this NPD (Requirement).
- (2) Provide institutional support for program/project manager implementation of this NPD at their respective NASA Centers and component facilities (Requirement).
- (3) Designate a qualified representative to the NASA MCWG to provide Center representation and input at MCWG meetings, workshops, and other designated activities (Requirement).
- (4) Provide for managerial oversight and documentation of Center measurement control processes, including the management of MTE calibration intervals and related recall programs (Requirement).

- c. Program/project managers shall:

- (1) Establish, implement, and monitor metrology and calibration requirements to implement the policy provided in paragraph 1 of this NPD for program/project management functions delineated in Attachment A of this NPD (Requirement).
- (2) Coordinate metrology and calibration efforts among Centers, component facilities, and other locations providing program/project support (Requirement).

6. DELEGATION OF AUTHORITY

None.

7. MEASUREMENT/VERIFICATION

Compliance with the requirements contained in this NPD is continuously monitored by the Centers and by the SMA Technical Authority. Compliance may also be verified as part of selected cycle reviews, and by assessments, reviews, and audits of the requirements and processes defined within this NPD.

8. CANCELLATION

NPD 8730.1B, Metrology and Calibration, dated April 29, 2004.

Updated with change 1, dated 10/2/2014

Charles F. Bolden, Jr.
Administrator

ATTACHMENT A: Functions and Conditions Requiring Measurement Controls

- A.1. Testing, qualification, certification, and/or acceptance measurements of flight hardware, ground support equipment, test systems, or other flight-related products.
- A.2. Measurements essential to the safety of personnel and the public or for the protection of Government or private property, including hazardous and/or critical applications.
- A.3. Operation of telecommunications and transmission systems where exact signal interfaces and circuit confirmations are essential to mission success.
- A.4. Research and technology development (see NPR 7120.8), manufacturing, inspection, testing, operations, maintenance, support, or other applications where the accuracy of measurements is essential to achieve mission success.
- A.5. NASA publications or other documents released for external review whose conclusions/recommendations depend upon the accuracy of measurement results and that impact the safety or success of NASA missions. Excluded are preliminary research papers and research instruments under development that have not had traceable units of measurement established.
- A.6. Physical measurements used to apportion, levy, or otherwise assign cost(s), or ensure local, State, or Federal regulatory compliance.

ATTACHMENT B: ANSI/NCSL Z540.3 Clarifications and Modifications

B.1. The term "customer" used throughout ANSI/NC SL Z540.3-2006 means the NASA Center and/or program organization that receives calibration or testing services.

B.2. The calibration requirements of ANSI/NC SL Z540.3 may be exempted for legacy MTE that is calibrated in accordance with ANSI/NC SL Z540.1- 1994. Legacy MTE consists of individual items, and all like items of identical technical description, make, and model, that are listed in the organization's existing MTE register at the release date of this NPD.

B.3. End-of-period-reliability (EOPR) values equal to or greater than 89 percent are considered acceptable evidence of compliance to ANSI/NC SL Z540.3 subclause 5.3.b, false acceptance requirements, and subclause 5.3.3, measurement uncertainty requirements, where such values are derived from statistically significant empirical data.

B.4. Original equipment manufacturers (OEM) may provide proprietary calibrations for their MTE. In such cases, the OEM should provide evidence of traceability and documented test data.

B.5. Guidance concerning estimation and evaluation of measurement decision risk, including false accept risk, is provided in NASA-HDBK 8739.19-4, Estimation and Evaluation of Measurement Decision Risk, and in the NC SLI Handbook for the Application of ANSI/NC SL Z540.3-2006, Requirements for the Calibration of Measuring and Test Equipment.

B.6. Guidance and methods for controlling the accuracy of measurement results are provided in the NASA-HDBK 8739.19 series of measurement handbooks. The handbooks are found at <http://www.hq.nasa.gov/office/codeq/doctree/hdbk873919.htm>.

B.7. Compliance to ANSI/NC SL Z540.3-2006 is considered to meet or exceed the requirements of ANSI/NC SL Z540.1-1994 (R2002).

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